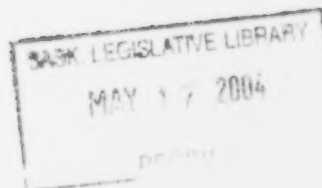




Saskatchewan
Agriculture
and Food



FINAL REPORT

Agriculture Research Branch
Saskatchewan Agriculture, Food & Rural Revitalization

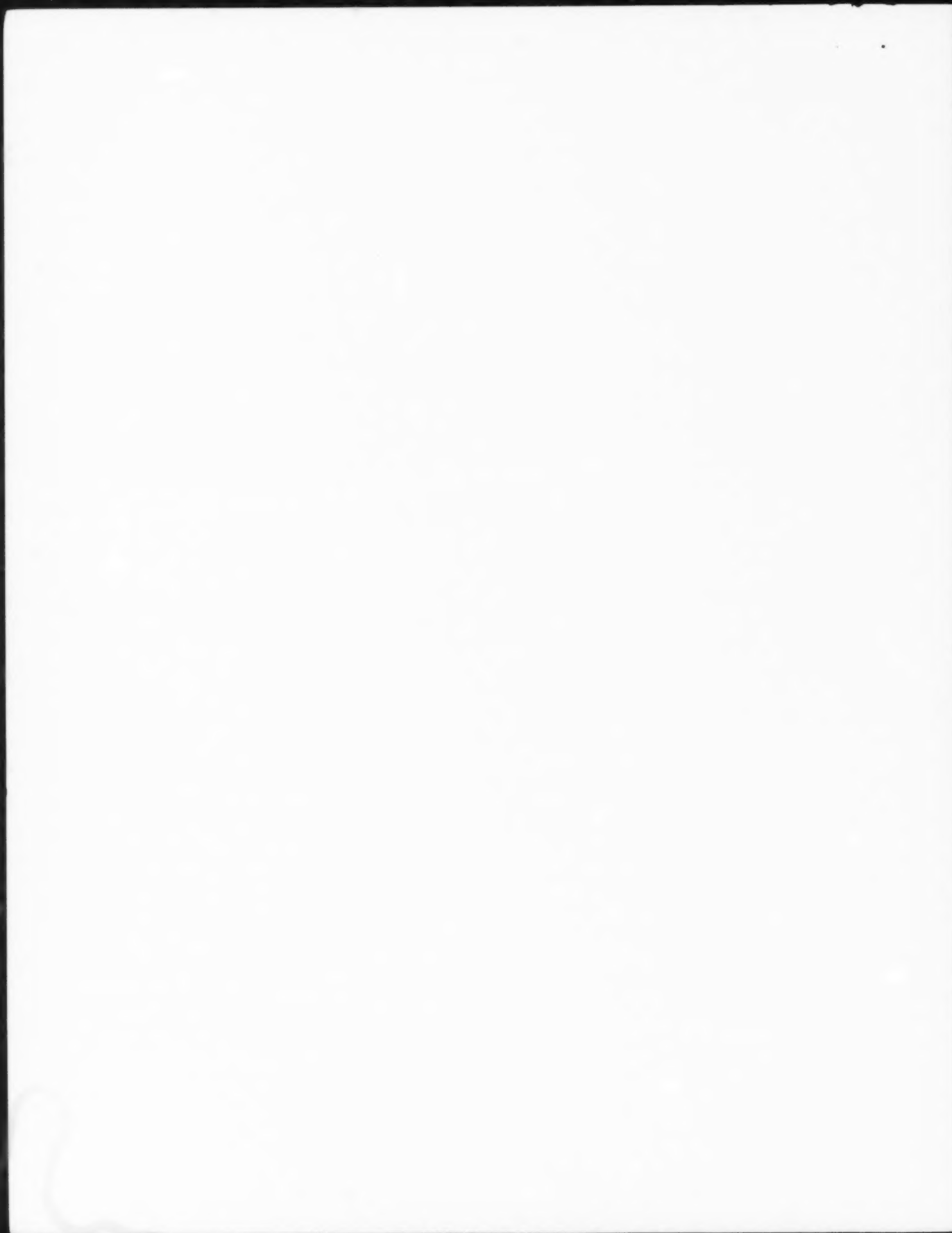
20010201

PRAIRIE FEED RESOURCE CENTRE - FEED RESOURCE
DEVELOPMENT
FINAL REPORT

Funded by
Technology Adoption Demonstration

March 12, 2004

Prepared by: University of Saskatchewan





Prairie Feed
RESOURCE CENTRE



Final Report

Prairie Feed Resource Centre *Feed Resource Development*

Project #20010201 – TAD 4

April 1, 2002 to March 31, 2004

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Abstract

Feed Resource Development

Vernon J. Racz, Director, PFRC

The Prairie Feed Resource Centre (PFRC) used TAD funding to provide support for initiating and facilitating a number of industry development projects. Support for core infrastructure of personnel allowed time and investment into project development. Modeling along with analysis of composition and nutrient behavior were used to develop new feed grain varieties and specialized feeds. Barley, oats, peas, canola and flax crops as feeds were involved in various feed crop development projects. Feed initiatives resulted in superior feeds for ruminants, feeds for aquaculture and value added processing to provide vegetable protein and fats into livestock diets.

Other initiatives were facilitation and development of value added processing facilities involving grain byproducts (screenings), pea fractionation, flaxseed processing and canola seed processing. A feed database was initiated and developed for industry and research use. Technical support for marketing was available to industry for products developed, and to provide for maximum impact of commercialization activities. A proactive technology transfer program was supported through presentations, news releases, publications and seminars nationally and internationally.

Key words: feed development, value added processing and commercialization.

Executive Summary

This project, through the TAD funding, supported core personnel to facilitate development of projects, key to development of the feed industry. Industry participation and support of the Prairie Feed Resource Centre (PFRC) programs and activities have been good and ongoing industry projects and contact continued, allowing new approaches, initiatives and investment of time for project development. The P.F.R.C. had, as its overall objectives, the development of feed resources to meet the needs of both the crops and livestock industry. Because the P.F.R.C. works within the University of Saskatchewan cooperatively with a broad range of projects, its role in proactive technology transfer and industry targeted feed development is key to the innovation process. Support is given from inception and application of basic research to commercialization. The areas of activity were:

1. Development of superior feed grains, forms and varieties having specific traits to give value and increased competitiveness.
2. Development of a feed database and economic feed models to support feed research and targeted development.
3. Development of new feed sources and specialized new commodity feeds with increased competitiveness in domestic and international markets.
4. Further, the development of crop byproduct processing facilities to support the crop and livestock industries and other value-added crop processing.
5. Develop programs with industry to address quality and feed safety issues to increase market preference and market retention.
6. To provide a proactive technology transfer program of feed development and support from basic research through to commercialization.

Results and Impacts from Activities:

1. Development of a superior feed oat grain with increased digestibility and energy content comparable to corn is in its third year of development. A low lignin hull high oil oat is 2.5 years from a commercial crop that will be marketed as an I.P. grain having advantages in the domestic and international feed market. Impact is substantial, estimated at 120 million dollars of increased economic activity arising from increased economic activity.
2. Projects to determine superior feeding characteristics on hulless barley and field peas have been completed with the project on field peas being continued and broadened in scope. Market situation for hulless barley is less than ideal; however, its utility has been demonstrated to the swine industry and international market. Results from the pea initiative have clearly shown the utility of NIR to enhance crop breeding efforts and to

facilitate commerce on a value basis. Considerable savings in evaluating breeding lines and increased marketability of peas are the results.

3. The initiative of prairie-based feeds for aquaculture saw some 8 specific feedstuffs evaluated for aquaculture use. Arising from these, has been the development of 3 new feedstuffs; more specifically, a canola protein concentrate developed by MCN Bioproducts, pea protein concentrate and development of a dehulled flaxseed for fish feed. The canola protein concentrate product will be commercialized by MCN in the near future. The pea protein concentrate development has led to a large pea fractionating facility being developed with intended construction in June 2004. This plant will consume 150,000 tonnes of peas for a value of production of some 35 to 40 million dollars annually. Flax dehulling is now in the stages of development with a commercial interest. A commercial partner, EWOS, has been instrumental in this project, providing supportive funding and a means of enhancing commercial development. Substantial effort was expended on this project and was supported through a proactive technology transfer program.
4. Use of whole canola and flaxseed in livestock diets: Several new feed products using whole canola seed and flaxseed were developed in combination with a commercial feed manufacturer. Oleet Processing in Regina manufacture products Extrapro and Linpro, which have whole canola and flaxseed, respectively, as main constituents. Ultragold, another whole canola product, is manufactured by Fahler Alfalfa in Alberta. Technical support in development and marketing was given domestically and internationally. The impact of the use of offgrade or green seed canola is substantial as it gives producers a use for this product. It is estimated that in the 2002 crop year some 200,000 plus tonnes of green canola were produced. Increases in value and price support for Saskatchewan canola producers were estimated at 20 to the 25 million dollars in addition to value-added processing activity.
5. Utilization of byproducts: Grain screening facilities at Wilkie and Weyburn had previously been developed in previous initiatives. As a continuation, support was given to facilities at Wolseley and Kelliher. The Wolseley plant is in operation while the plant at Kelliher is developing slowly due to the BSE crisis. Other crop byproduct technical support for use was given for caraway meal, oat hull ammoniation and ethanol production. The grain screening processing initiative has now developed into a 200,000 tonne industry with a value of some 30 million dollars of product from value-added processing with a further \$70 million of feeding activity and \$8 million in freight cost savings to grain producers. The BSE crisis has greatly impacted byproduct utilization.
6. The P.F.R.C. has been a key partner in the crops livestock interface project. Value modeling to determine which and what should be improved to give greatest impact has been one initiative. Impact is specific targeted research for greatest return within industry. Another initiative is that of database development. A database for researchers and separate feed information on the P.F.R.C. website for industry will be available June 2004. This database will greatly enhance and target research initiatives by identifying specifically valued traits as well as facilitate prairie feed use domestically and

internationally. A unique opportunity in providing a value-added pelleted barley to Japan has arisen. Japanese research funding has been secured for feeding trials in Canada and Japan. Further, two large Saskatchewan inland terminals linked to the project are providing test pellets to Japan (150 tonnes) with an expected market of 200,000 tonnes of feed barley annually to Japan.

The P.F.R.C. has provided a proactive technology transfer role through 10 newsletters (Feed News), 55 presentations, 18 press releases and numerous telephone contacts. Technical marketing support was given nationally and internationally as well as participation in marketing missions for project enhancement to such places as Korea, Chile and Europe.

The program of feed resource development has had substantial impact during the past two years and yet to come in the near future of well over \$80 million annually in value-added activities. Problems created by the BSE crisis have tempered the impact and reduced the intensity of some aspects of initiative development. The aquaculture initiative has, in many respects, been the brightest light followed by new feed product (canola, flax) and feed variety development (barley, oats). These developments and those of this type, seem to be the way to the future.

The role played not only by the P.F.R.C. and its great many collaborators, is key and central to creating, initiating and implementing technologies. Support for research projects has clearly defined funding sources and, similarly, the construction of bricks and mortar by industry has defined purposes. What is lacking, and support must be given, is to bridge that gap between research and commercial implementation. This area or gap should be treated as an alliance for success rather than a strict business with no support or follow-up given beyond contractual agreement. The next initiative that should be strongly pursued is that of facilitating feed safety issues and identify preserved production of crops as a system. Lack of development in this area means only a part of our potential benefits will be realized with limited benefit to Saskatchewan agriculture and producers.

The TAD initiative with the P.F.R.C. has been successful and the P.F.R.C. Board and University of Saskatchewan sincerely expresses its appreciation to the TAD program. Saskatchewan Agriculture, Food and Rural Revitalization and also the Industry and Resources Department should be commended on the program and the trust shown in us.

Prairie Feed Resource Centre

Feed Resource Development

The period of April 1, 2002 to March 31, 2004 for the PFRC was one of reconstructing and changing program operations and emphasis to meet the needs of an ever changing agricultural industry. To carry forward in this period a strong ongoing program previously developed by the PFRC was present and formed the initial basis of the activities and initiatives for this project. In addition several new initiatives have been introduced as next steps in industry development.

Industry participation and support of the PFRC programs and activities have been good. Reduced base or core funding has meant changes in the structure of the PFRC and how the PFRC operates to meet its mandate. The reduced funding during this period was supported in part by the cash flow accumulated and existing ongoing projects supported by industry and public funding.

The board of the PFRC recognized the need for change and moved in this period to deincorporate the PFRC allowing it to reside within the Department of Animal and Poultry Science. Substantial efficiencies and cost savings from administration and operating were gained with this move. Industry input into the PFRC was seen as a priority to be maintained and workable structures to accomplish this were sought with the board. Some 15 separate industry companies and groups are members of the PFRC having a say in direction and initiative.

The objectives and mandate of the PFRC has remained the same, but has adapted and evolved to fit industry needs and operating environment. The areas and activities of work by the PFRC during this period are described with potential impact of specific projects.

Latest estimates indicate traditional feed processors in Saskatchewan producing 290,000 tonnes of feed annually, mostly supplements for a value of 60 to 80 million dollars. With increased size and specialization, livestock producers have moved to on farm mixing and purchasing supplements. Traditional feed manufacturing companies and livestock producers to a lesser extent view themselves as users of feedstuffs using nutrient value and cost to determine feeds purchased. In addition both feed processors and livestock producers due to consumer demand for food quality and the need for feed quality to meet production efficiency goals are demanding newer and better-feed products. Crop producers in Saskatchewan produce over 10 million tonnes of feedstuffs in various forms and are reliant on markets beyond Saskatchewan as domestic consumption is not adequate. Rising transportation costs, globalization and increased feeding technology of byproduct use have reduced competitiveness of traditional major feed

sources such as barley. With increasing size of operations crop producers are moving to production contracts, forward selling and economic analysis to decide which crop is grown.

Globalization has led to less captive markets for feed crops and animal products. While the feed market has changed, the challenge now is to increase competitiveness. Market intelligence and delivery of products according to contracted specifications is a must. Feeding technology and feed evaluation along with increased technological sophistication of feed ingredient users has changed market demands and value of feed products. Some domestic livestock producers and particularly a number of international markets have become increasingly sophisticated beyond the scope of the average resources available. Carefully placed resources on a coordinated basis to directly support economic activity by industry have been identified as necessary to move the industry forward.

The domestic beef industry was recognized as a major growth area but the BSE problems starting in May of 2003 impacted heavily on development of feedstuffs and value added processing such as ethanol plant development as well as the beef industry. Some projects such as the Kelliher pelleting plant are in a stalled position. Others not related to the beef or swine industries continued to develop.

Objectives and areas of Activity:

- A) Participate in and facilitate the development of superior feed grain varieties from initial evaluation through to commercialization. Through the use of nutritional and economic value models, determine how and what feeds can be developed for greatest economic impact. The evaluation of nutrient characteristics of feeds, participation in nutrient evaluation projects and commercialization of specific varieties with technical support of marketing are the activities identified with this objective. Modeling is now being used in a project with feed peas and barley to identify and develop superior lines. This aspect is much more advanced in the development of a superior feed oat that has a digestible hull and increased fat content (low lignin hull, high oil oat project). This oat should have an energy content similar to wheat or corn for ruminants, but have specific feeding advantages over wheat and/or corn. A commercial partner is participating in this particular development. This process of development and commercialization is serving as a model for development of other new varieties. Industry trends to IP grains and requirements for food safety issues are being facilitated by this project.
- B) To develop feed databases, analysis and nutritional economic models to be used in feed evaluation specifically targeted to support industries technical needs for information and marketing. Program types initiated were those that would broaden the scope of feed use and create an efficient system of feed production and utilization. The technical

information and resources to support economic activity were seen as key to development for the feed sector.

- C) The development of new feed sources, specialized and near commodity feeds through innovative applied research and development. Continued activity with industry in developing special feeds such as the pea, canola and flax products are one means. In addition specialized feed development arising from crop processing and fractionation are seen as opportunities. Potential economic development is large and is similar to that of developing new feed varieties. Because of specific needs in a product value added processing is present in one form or another. One such development, which has commercial participation has potential for a market of 150 to 200,000 tonnes or \$60 to \$80 million annually. Market potential and economic impact in the sector is limited only by innovation and resources to initiate development.
- D) Further the development of crop byproduct processing facilities, evaluation and utilization of byproducts. The grain screenings facility development was seen as a model and should be continued to be developed with others as well byproduct evaluation and use arising from value added processing. The grain screening pelleting facility at Wilkie has generated over \$26 million of real economic activity in the 2001 to 2002 crop year. It also serves to sustain a cattle industry in the region which may have otherwise been more severely affected by drought.
- E) To develop programs with industry to address product quality assurance aspects of feed commodities essential to maintaining markets. Activities which would reduce the presence of excess and inappropriate foreign material and the development of quality parameters to meet the needs of domestic and export clients (forages, grains and oilseeds) were pursued. Market loss due to inability to prove feed safety or quality could be devastating but taken as a positive initiative, increased competitiveness and market share could result.
- F) The provision of technology transfer activities to support industry in marketing, product application and feed utilization. It should be emphasized that the level of technology required is high and requires that technology be put forth on a coordinated basis. Information to the industry at large, of trends and new happenings were seen as a leadership role plus technology transfer activities that would bring new concepts in feed development forward for consideration (proactive technology transfer). Many growing companies and community economic development initiatives lack research infrastructure and human resources of adequate expertise to achieve appropriate levels of success.

Specific Applied Research and Development - Industry Projects

1. Low Lignin Hull / High Oil Oat Project

- Development of a high energy oat grain
- Collaborators: Crop Development Centre (CDC), Dairy Production Research Unit, Beef Production Research Unit and Super Oat Canada.
- Funding: over 5 years from SuperOat Canada (50%); renewed for 2 more years, ADF (50%), Jan. 2006
- Status: Ongoing, initial concept proved, with go ahead for commercial variety development given by commercial partner. Feeding trials with beef and dairy are positive and market development initiatives are beginning to introduce new variety in 2 to 3 years
- The impact of this new oat variety is estimated to be \$120 million of new economic activity and a more competitive livestock industry. The variety will have breeders rights and marketed as an IP grain into domestic and international markets.

2. Identification of Hulless Barley Varieties with Superior Feeding Characteristics

- Collaborators: Crop Development Centre (CDC), Poultry Research Group (PRG), Prairie Swine Centre (PSC), Dairy Production Research Unit (DPRU), Dr. Leigh Campbell
- Funding: over 3 years starting 1998
- Funding Source - University of Saskatchewan's First and Best Campaign.
- Status: Completed
- Target is to provide superior hulless barley varieties for contract production destined for swine use in the domestic and international marketplaces. Through these endeavours a research contract with NACF in Korea has been made for work involving Canadian feed barley and white hard fat in swine. This is being carried forward by P. Thacker in the Department of Animal and Poultry Science in cooperation with the PFRC. Initial feeding trials on fat composition have been completed with follow up and market development in Korea dependent on Korean partner. Barley accessibility and Korean Foot and Mouth Disease problems are concerns to the project and is proceeding slowly pending further market. Research though indicates a possible market for hulless barley and wheat into this and other Asian markets.

3. Determining and Measuring Nutrient Parameters to Identify Superior Feed Pea Varieties

- To determine nutrient content of feed pea varieties and use these parameters to direct selection of new superior feed varieties
- Collaboration: CDC and Sask. Pulse Growers, Prairie Swine Centre.
- Funding: over 4 years starting May 2004 and is a continuation of work began in 1999
- Funding Source: Saskatchewan Pulse Growers Association (50%) and ADF(50%)
- Status: Successfully completed Dec. 2002. Project continuing with Pulse Canada support and ADF as a priority.
- Impact: A method for the rapid evaluation of pea feeding value for commerce has been developed and defined and will provide measured selection criteria through NIR, for

application by crop breeders in selecting new superior feed peas. The results of NIR analysis are most encouraging and have good industry interest. Project has now shifted to make NIR calibrations more robust with transfer of technology to industry. The project has also been broadened to include NIR measurement for net energies with swine. This is being carried forward with R Zilstra of the PSC. The speed and number of pea samples capable of being selected for is substantially changed allowing for substantial savings of time and money. The improvements to marketing endeavors keeps us in the market by meeting customers needs.

4. Development of a Process for the Fractionation and Enzyme Treatment of Canola Meal to Generate High Quality Feed Ingredients

- Project Director: MCN Bioproducts Inc.
- Funding Source: MCN; Payment on a per experiment basis
- Status: Ongoing, Confidential report.

5. Development of Prairie-Based Feed Ingredients for Aquaculture

- Collaboration: PFCR, EWOS Canada
- Funding: \$440,000 over 4 years starting July 2000
- Funding Source: EWOS (\$240,000), AFIF (\$200,000)
- Status: Ongoing
- Development of prairie-based aquafeeds has large potential. One feed combination could have a market of 150,000 tonnes or \$60 million annually.
- Strategic project to develop aquaculture feeds from Saskatchewan feedstuffs. EWOS is a large fish feed manufacturer with head offices in Norway. Because fish feeds are specialized feeds, there is a large opportunity to have value added processing and provision of near commodity feeds. EWOS represents one of the largest markets for these feeds.
- Work with the aquaculture feeds and feeding trials have opened possibilities with pea protein concentrates, dehulled flaxseed, and dehulled canola. These findings are now being taken to industry to try to develop value added enterprises with reasonable success. Two crop fractionating enterprises are at initial stages of development with both having completed a business plan for development along with pilot processing for P.P.C. development. Other byproduct use is being facilitated for the starch fraction into ethanol and food products.
- An initial plant for Pea fractionation is planned to be built June 2004 that would produce some 40 to 500000 tonnes of PPC from 150 to 170,000 tonnes of peas. Support through consulting, research and market development is being given for not only PPC but resulting byproducts (hull and starch). Impact would exceed 35 million dollars annually for the one facility with an alliance being contemplated for a second facility of equal size. Confidentiality limits greater description of results.
- There is strong interest from one industry partner for flaxseed and canola dehulling and are developing a business plan and process development for a commercial plant.

6. Canola Meal Quality Program

- Funding: over 3 years
- Funding Source: Saskatchewan Canola Development Commission
- Ongoing
- Project to monitor canola meal quality and activities to improve quality

7. Caraway Meal as a Feedstuff

- Collaboration: PAMI, Dairy Production Research Unit
- \$7,500 over 1 year
- Status: Completed. Evaluation of Caraway meal arising from commercial production as a feed source. Feed represents a viable economic alternative to an otherwise environmental liability. Project was completed in June 2002 with results showing potential, and how to use caraway byproduct in beef diets.

8. Screening processing Facilities - Wolesley/Kelliher

- Duration: ongoing with various groups
- Funding: \$10,000 over 1 year (Kelliher, others, on as needed basis)
- Funding Source: Carlton Trail Pelleting, West Central Pelleting, Weyburn, Inland Terminal
- Status: The Wolesley group through West Central Pelleting have built and opened a grain screening pelleting facility in October 2002. The Kelliher Pelleting began their share offering in July 2002. Assistance has been given to Wolseley and now has shifted emphasis to the Kelliher group. The Wolseley plant and Kelliher plants each are targeted for 50,000 to 60,000 tonnes of production. Each plant is estimated to generate some 2.4 million dollars of freight savings to producers, another 6 million dollars of value added activity and allow the feeding of 60,000 calves for 24 million dollars in added value of the gain on the animals. Together, if both are built, will add over \$60 million of yearly economic activity, to be added to the existing facilities at Wilkie, Weyburn, and Central Butte.
- The pelleting facility at Kelliher has been delayed in development due to the BSE issue May 2003 and has raised some 65% (700,000) of its capital needs. This initiative is continuing to try raise its required investment dollars.
- The development of byproduct processing facilities is seen as an integral part of crop value added processing away from the larger urban centers.

9. Use of Micronized and Extruded Whole Flaxseed in Aquaculture Diets

- Funding: \$12,000 for 1 year
- Funding Source: Saskatchewan Flax Development Commission
- Status: Completed 2002. There is commercial activity with one new product and opportunity for added commercial linkages. If this added linkage occurs with success in marketplace, economic benefits are expected to be over \$80 million yearly. This project is being linked with commercial interests and ties in well with value added processing.

10. Utilization of Whole Canola Seed as a Feed Ingredient

- Funding: \$9,000 for year 1 and is funding redirected from canola meal quality project.
- Funding Source: Saskatchewan Canola Development Commission.
- Status: The PFRC has led the development of pea-canola meal blends, extruded whole canola and pea mixes. Opportunity exists for use at the farm or feedlot levels of sample, heated or green canola-plus development of new feed products. Damaged and regular whole canola seed use broadens markets and directly benefits producers. Expected impact could be in excess of \$8 million annually to producers. Economic impact for 2002 to 2003 will be in excess of this due to weather conditions encountered in the 2002 crop year. Much sample and green seed canola has been absorbed as feed and oil source as led by this initiative. Much impact is at the producers' level where whole seed is used for greater economic value than was available previously to the producer. Industry estimates for the 2002 to 2003 crop year an added return of 20 to 25 million dollars to Saskatchewan canola producers.

11. Processed Flax for Livestock Feeds

- Duration: 3 Years
- Funding: \$15,000/year
- Collaborators:
- Funding Source: Saskatchewan Flax Development Commission
- Status: Project initiated and focuses on activities with flaxseed use for aquaculture. Expected impact would be increased flax use and value added processing in excess of 80 million dollars annually. This project ties in well with the flaxseed dehulling project supported also by TAD with PAMI. Results are encouraging, with commercial activities being aggressively pursued and supported.
- A feed product was developed using extruded whole flaxseed and peas to be fed to dairy chickens, swine and horses to provide attributes beyond nutrients to promote animal health and designer milk, meat and egg products. The product LinPro is sold nationally as well as internationally. Products of this type are expected to grow in demand as feed product need grows beyond straight nutrient provision.

12. Crops-Livestock Interface Project

- A multidisciplinary project with PFRC involvement in feed evaluation, database, development and feed development priority modeling.
- A unique project combining expertise across disciplines to maximize impact. This project is in its second year of operation, but promises to provide key infrastructure for feed development.
- The project is ongoing having been funded for 2 more years through ADF. The PFRC will have a searchable database for use by researchers June of 2004 and a descriptive feed information source on the website at a similar time. These databases will allow modeling and an international and national information source for the industry.

- An application of the information has recently developed with a demand from Japan of a barley canola feed pellet. Working with a Japanese university feeding trials here and in Japan have been set up. The Japanese industry client is funding both feeding trials and two Saskatchewan inland terminals are providing initial barley of a pre selected variety. If the feeding trials prove out this represents a market for 200 to 300000 tonnes of processed barley or 40 to 50 million dollars of activity. Confidentiality and interference from other groups such as government sponsored agencies is an issue when developing projects of this type requiring expertise and strategic alliances.

Developing Projects:

1. Development of models to enhance livestock and crop production efficiency while demonstrating food safety

- Project to develop specific feed varieties and enhance their integration into the livestock industry
- Collaborators: Crop Development Centre and industry
- This direction is seen as key, as the success of new feed sources or feed varieties depends on a system of introduction that benefits producers and yet is commercially driven. The Board of the PFRC is seeking human resources and funding to drive this project forward. Negotiations are occurring with Agriculture and Agri-Food Canada and Saskatchewan Agriculture, Food and Rural Revitalization. The PFRC has been unable to drive a project of this type forward. It is trying to do this in the pelleted barley to Japan where feed traceability with IP of superior varieties is important to retain market in the longer term. It is also the reason why a visible structured program must be developed to not only meet clients needs but to educate commerce to compete on the same playing field.
- The PFRC will continue to seek funding.

2. Development of processes to fractionate crops for the production of value added feed/food/industrial products.

- A. Project will examine the feasibility of a crop processing facilities to produce protein concentrates for feed/food uses and carbohydrate concentrates for industrial use.
 - Collaborators: Poundmaker AgVentures, North East Terminal.
 - Project is at the initial stages of development with pilot scale testing (i.e. air classifying peas for protein concentrates and pea starch for ethanol production.) These projects have now proceeded to develop business plans with one completed. As previously indicated one plant will start construction in June 2004 and may precipitate a similar plant at another location through a similar alliance.
- B. Specialty malt plant development: There are considerable synergies that could be gained from linking malting barley and feed barley together in a system providing greater sustainability to barley production and also feedlot operations. This is being pursued with North East Terminal, Wilkie and Tisdale groups.

- The impact is substantial to the region. Each plant that is established will generate some 30 to 40 million dollars yearly of economic benefit directly to crop and livestock producers and the local area.

The developing projects reflect only a portion of the true impact and resources needed for opportunity capture. There is considerable work involved in linking industry projects together. The intent of this linking is to commercialize and facilitate a product into the marketplace. Fish feed development is one area that promises development with this type of approach. While it could be called brokering the skills needed is dependent on the application of technology.

Lab Analysis in Support of Industry and Collaborators

- Laboratory analysis to support projects from industry and collaborators was provided.
- The amount of funds received varies and is used to maintain laboratory personnel. Under the new structure personnel can now be co-shared to not only improve response, save dollars, but maintain a higher level of expertise. This approach has worked well.

Professional Services during period

- Professional support and expertise for feed product and market development (approximate value \$40,000/year).
- Professional support and expertise for litigation and industry product development (approximate value \$5000/year, confidential)

Consulting and Technology Transfer Activities - General

The period in April 2002 initially started as in previous years with a similar level of activities, however, by May it became evident that an increased level of joint activity would be needed to respond to the demands of the drought. As the year progressed this regressed into frost damage and further into frost and weather damaged grains. To say the least, it taxed the capability of the system to respond adequately to the demands from producers and industry. The PFRC because of its past history and involvement was a primary contact and participant in responding to information. Responses were as a key part of a drought group at the University of Saskatchewan. Within the department of Animal and Poultry Science group, D.A. Christensen, John McKinnon, Murray Feist of S.A.F.R.R. and Vern Racz formed a team for response. As the year progressed into September, the emphasis on drought switched into coping with frost and making the best of weather damaged grains and forages. The 2003 crop year returned to a more normal demand for information.

To support this endeavour the following activities were resourced by the PFRC:

- 55 producer meetings (22 in 2003-04) throughout Saskatchewan regarding feed utilization and resource development.
- 10 radio and 3 TV appearances
- 11 press releases prepared with the Animal Science group for newspaper and University of Saskatchewan website
- intensive literature search on and technical aspects on 15 feed and feeding problems.
- Responded to 1430 requests for information on feed problems.
- Worked with a group of livestock producers to develop a procedure for ammoniating oat hulls and helped to technically support APASS in their feed endeavours to link buyers and sellers. This project on oat hull use arose from a previous project with J. McKinnon and D.A. Christensen and V. Racz supported by CanOat Processing and CARDS. The direct application on a practical basis for oat hull ammoniating was with 6 producers (cattle) in the Martensville area and included J. McKinnon, M. Feist, V. Racz, and collaborators. Pictures of the application system developed were included in the last progress report. Impact of technology allowed the greater use of oat hulls for cattle feeding. For these 6 producers it allowed the retaining of their herds during the drought at minimal cost and disruption of operation.
- The last two year period has also seen the preparation of ten issues of "Feed News" published for it's membership and others.
- Two annual feed information days were held to update industry and deal with particular problems. Participation has been good with some 80 100 people in attendance each year.

Other PFRC Activities: 2003 To 2004

- Technical support and development given to one new feed products marketed domestically
- International technical marketing missions completed on site, Japan (1), Taiwan (1), Chile (1), Europe (1) Total time 5 weeks.
- Out of province presentations: Winnipeg (1), Edmonton (1), Olds College (1), Japan (3), Taiwan (3)
- In province presentations (22). Presentations to support pelleting plants and rural development.
- Hosted and presentations to 7 groups, all international (2 China, 3 Japan, 1 Iranian, 1 Mongolia)
- Publications: co-author on 4 papers, 1 abstracts, 2 posters.
- Individual meetings and visitations to initiate projects (13-15)

Research and Development Personnel linked to the PFRC

<u>Personnel</u>	<u>Position and Duties</u>
Vernon Racz	Executive Director
Murray Drew	Associate Professor Dept of animal and poultry science
Debbie Thiessen	Research Assistant/Ph.D. Student
Kendall Waithman	Research Technician
Kathe Harder	Office Support

Acknowledgment: The TAD initiative with the P.F.R.C. has been successful and the P.F.R.C. Board and University of Saskatchewan sincerely expresses its appreciation to the TAD program. Saskatchewan Agriculture, Food and Rural Revitalization and also the Industry and Resources Department should be commended on the program and the trust shown in us.